REMARKS

The application has been amended to place it in condition for allowance at the time of the next Official Action.

Claims 1-30 were previously pending in the application. Claims 2, 3 and 30 are cancelled and new claim 31 is added. Therefore, claims 1, 4-29 and 31 are presented for consideration.

Reference numerals are removed from each of the claims. In addition, the word "characterized" is removed from claim 1. The above changes are believed to address the claim objections noted in the Official Action.

Claims 1-30 were rejected under 35 U.S.C. § 112, second paragraph for including the phrase "such as". The phrase "such as" has been removed from claim 1 to address this rejection and withdrawal of the same is respectfully requested.

Cancelling claim 30 is believed to obviate the rejection under 35 U.S.C. § 101. Similarly, cancelling claim 30 is believed to obviate the rejection of the 35 U.S.C. § 112, first paragraph.

Claims 1-6, 8-11, 13, 15-21, 23-27, 29 and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable BACKMAN et al. (US Patent 6,624,890) in view of JANES et al. (US Patent 5,280,788) and further in view of CANE et al. (US Publication 2001/0056237 A1). That rejection is respectfully traversed.

Claim 1 is amended to clarify that the present invention relates to a device for analyzing cartilage thickness. The device of claim 1 includes light generating means and a probe for illumination of the surface of the cartilage. A light detecting means is arranged to detect back-scattered light received by the probe. A processing unit is arranged to use the information of the intensities detected by the light detecting means so as to determine the cartilage thickness based on a relative optical effect of cartilage and underlying bone. Support for the added features of claim 1 can be found at least on page 8, lines 33-34 and page 9, lines 15-18 of the application as filed.

None of the cited references relates to the thickness measurements of cartilage as recited in claim 1.

Rather, BACKMAN describes a device for detecting tissue dysplasia (pre-cancerous stage) based on polarized light spectroscopy. The device disclosed in BACKMAN is based on polarized light scattering spectroscopy and does not utilize absorption spectral features. Moreover, the device of BACKMAN is not related to a cartilage thickness measurement device based on spectral absorption differences between cartilage and bone. Indeed, BACKMAN does not related to thickness measurements at all.

JANES discloses a device, in the shape of a needle optical probe for directing laser radiation to a tissue and

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collecting the back-scattered response. Such device is not directed to measuring the thickness of a tissue. Rather, such device characterizes the spectral characteristics of a tissue. JANES does not disclose thickness measurements of cartilage as recited in claim 1.

CANE discloses a device for monitoring a presence of one or more chromophores in tissue, especially epithelial tissue. Such device is used to measure tissue color CANE does not determine thickness of a cartilage layer covering bone.

Rather, as set forth above, CANE is directed to skin color measurement.

Moreover, CANE does not disclose studying a relative contribution in a spectrum (plurality of wavelengths) measured at the cartilage surface.

The above noted features are missing from each of references, or absent from the proposed combination of references and thus, the proposed combination of references does not meet claim 1.

By way of further explanation, present claim 1 measures a relative effect of the optical properties of cartilage and underlying bone at a plurality of wavelengths. In practice, this is performed by measuring the intensity ratio between reference light, where bone and cartilage absorption are similar, and measurement light, wherein bone and cartilage absorption differ.

This derived measurement is highly important to correctly determine cartilage thickness.

By contrast, CANE is based on comparing measured skin spectrum/color representing a normal state of the investigated tissue (see claims 1, 35, 53 and 58 of CANE).

Moreover, CANE is aimed at detecting superficially located chromophores. Any chromophores of the present invention are deeply located (in the bone below the cartilage layer), and only used as a basis for determining the thickness of the cartilage layer.

Further, CANE is directed to means for mapping thickness of skin tissue (see claims 13, 34 and 54). Such thickness of skin tissue is not a thickness measurement but only a relative measure to correct measured color information. CANE does not disclose or suggest the features of claim 1.

The dependent claims are believed to be patentable at least for depending from allowable independent claim.

In addition, claim 17 is rewritten in independent form. Claim 17 related to a device for analyzing cartilage surface roughness and/or degree of cartilage to collagen fiber linearization. The device includes light generating means and a probe for illumination of the surface of the cartilage. Light detecting means are arranged to detected back-scattered light received by means of the probe. The light generating means are arranged to generate polarized and non-polarized light. A

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processing unit is arranged to use the information of the back-scattered light so as to derive surface roughness and/or collagen fiber linearization based on intensities of back-scattered polarized and non-polarized light. Support for these features can be found in the original claims and on page 8, lines 35-36.

BACKMAN is based on polarized light spectroscopy for the detection of tissue dysplasia (pre-cancerous stage). BACKMAN does not relate to a device for analyzing cartilage surface roughness and/or degree of cartilage collagen fiber linearization.

Moreover, BACKMAN is based on scattering by cells and cell structures in epithelial tissue (to detect the dysplasia). By contrast, the recited device is based on scattering of collagen fibers of cartilage, a relatively acellular connective tissue (to detect, for example arthritis).

Further, BACKMAN discloses a spectral measurement (to determine the size and density of cell nuclei). Claim 17 does not depend on spectral measurements.

Still further, BACKMAN is dependent on removing information from underlying tissue structure. The device of the present invention does not depend on such a procedure.

Yet still further, since BACKMAN is a method for dysplasia detection, such method is based on analysis of a periodic component within a detected spectrum. By contrast, cartilage surface roughness and/or degree of cartilage collagen

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fiber linearization is determined by studying the intensity ratio between polarized and non-polarized light. That is BACKMAN utilizes polarization technology to remove disturbing components from underlying tissue layers, and not as inherent part of the analysis (dysplasia algorithm).

Neither JANES nor CANE disclose deriving surface roughness and/or collagen fiber linearization based on polarized and non-polarized light transmission.

Accordingly, claim 17 and the claims that depend therefrom are believed to be patentable of the proposed combination of references.

Claims 7, 12, 22 and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over BACKMAN in view of JANES and further in view of CANE and still further in view of KANEKO et al. (US Patent 5,305,759). The rejection is respectfully traversed.

KANEKO is only cited with respect to the features of claims 7, 12, 22 and 28. KANEKO does not overcome the shortcomings of BACKMAN/JANES/CANE as set forth above with respect to claims 1 and 17. Since claims 7, 12, 22 and 28 depend from one of claims 1 and 17, these claims are believed to be patentable at least for depending from allowable independent claim.

Claim 14 was rejected as unpatentable over BACKMAN in view of JANES and further in view of CANE and still further in

view of RICHARDS-KORTUM et al. (US Patent 6,370,422). That rejection is respectfully traversed.

RICHARDS-KORTUM is only cited with respect to features of claim 14. RICHARDS-KORTUM does not overcome the shortcomings of BACKMAN/JANES/CANE as set forth above with respect to claim 1. Since claim 14 depends from claim 1 and further defines the invention, claim 14 is believed to be patentable at least for depending from an allowable independent claim.

New claim 31 is added. Support for the new claim can be found in the original claims and on page 8, lines 33-36.
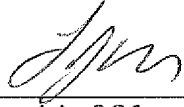
In view of the present amendment and the foregoing remarks, it is believed that the present application has been placed in condition for allowance. Reconsideration and allowance are respectfully requested.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any deficiency or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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